**IN THE ABSTRACT**

An apparatus for replacing at least a portion of an intervertebral disc in a spinal column includes: a first member having ~~a first vertebral contact surface for engagement with an endplate of a first vertebral bone in the spinal column, and having~~ a first articulation surface that is defined ~~at least~~ by a concave arc having a radius of curvature A about a first axis substantially perpendicular to an anterior-posterior plane of the spinal column, and by a convex arc having a radius of curvature B about a first axis substantially perpendicular to a lateral plane of the spinal column. The apparatus includes ~~,~~ ~~and~~ a second member having a ~~second vertebral contact surface for engagement with an endplate of a second vertebral bone in the spinal column, and having a~~ second articulation surface that is defined ~~at least~~ by a convex arc having a radius of curvature C about a second axis substantially perpendicular to the anterior-posterior plane of the spinal column, and by a concave arc having a radius of curvature D about a second axis substantially perpendicular to the lateral plane of the spinal column. ~~, wherein: an intervertebral disc space is defined substantially between the first and second endplates of the first and second vertebral bones, and t~~The radii of curvature of the first and second articulation surfaces are sized ~~such~~so that the first and second articulation surfaces engage one another when the first and second members are disposed in an~~the~~ intervertebral disc space ~~to enable the first and second vertebral bones to articulate in at least one of flexion, extension and lateral bending~~. The first member has a first center of rotation located below the articulation surfaces during flexion/extension and a second center of rotation located above the articulation surfaces during lateral bending.